

Payload Integrated Education and Public Outreach: Student Nanoexperiments

Technical Team

Kimberly Kuhlman, Michael Hecht, David Brinza

Jason Feldman, Stephen Fuerstenau
JPL, Caltech

Linda Kelly, Louis Friedman
The Planetary Society

Collin Lewis, Csaba Gyulai, George Powell
Visionary Products, Inc.

Anna Waldron
Cornell University

Thomas Meloy
West Virginia University

Peter Smith
University of Arizona

Student Investigators

Angle of Repose of Martian Dust

Lucas Möller
Moscow Junior High School, Moscow, Idaho

Contradistinctive Copper

Kelly Trowbridge & Jessica Sherman
Lansing High School, Lansing, New York

Spacesuit Materials for Mars

Adam Marshall
Chapel Hill, North Carolina

&

Andre Luis Diaz
São Paulo, Brazil



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA
TUCSON ARIZONA

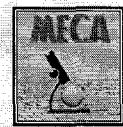
The Motivation

➤ Involvement of students worldwide in a planetary science mission.

- Stimulate students 18 years of age and younger to explore what is necessary to invent and propose an instrument for space flight.
- Development of curricula to simulate the nanoexperiments using common materials and "kitchen chemistry."
- Immediate distribution of returned scientific data to the public for use in classrooms, etc.

➤ Prototype of small, self-contained experiments for future missions.

- Future competitions can be held for grade schools, undergraduate and graduate students.
- Tiny "gas-can" type experiments may be proposed by the scientific community at large.



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA
TUCSON ARIZONA

The Mars Environmental Compatibility Assessment (MECA) Nanoexperiment Challenge

- The MECA Student Nanoexperiments were the first student experiments proposed to go to Mars.
- Conducted in partnership with The Planetary Society, the worldwide competition was open to pre-college students, up to 18 years of age, in teams of 1-3.
- The flight hardware was fabricated by Visionary Products Incorporated, and integrated into the MECA Patch Plate at JPL.



JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA

MECA Nanoexperiment Challenge: Requirements

Each proposed nanoexperiments was to:

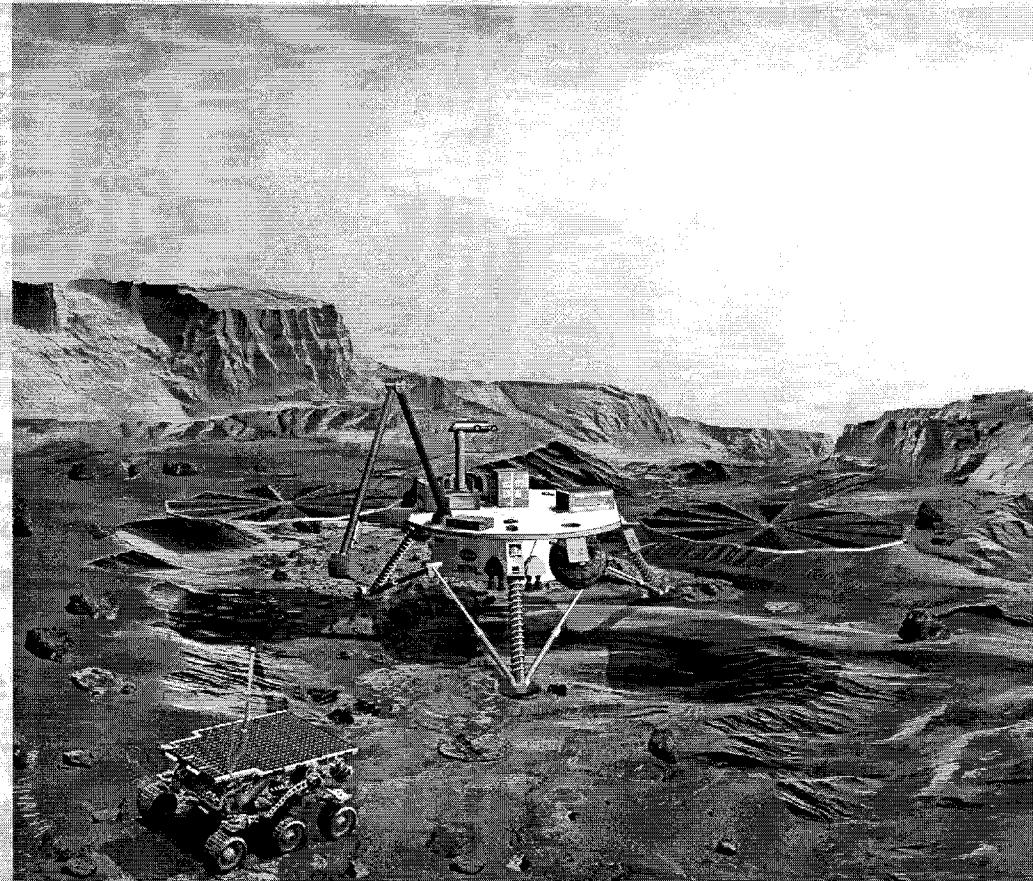
- Be consistent with MECA's Mission: "*To help us better understand how humans will be able to live on Mars.*"
- Plug directly into the MECA Patch Plate.
- Fit into a 1 cm diameter tube, 1 cm in height.
- Have mass less than 3 grams.
- Be fabricated from space-compatible materials.
- Be observed only by the Robot Arm Camera.
- Require no power or communications.
- Contain no moving parts.
- Submit prototype and short proposal.



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA

The Mars Surveyor 2001 Lander



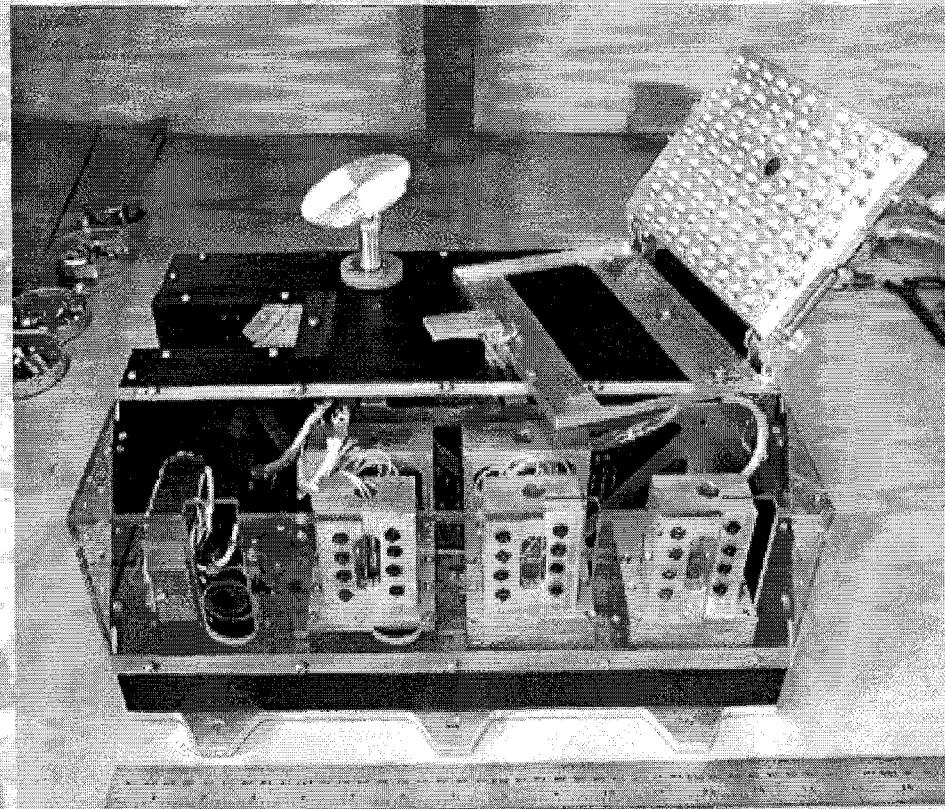
JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON, ARIZONA

Engineering model of MECA instrument suite.



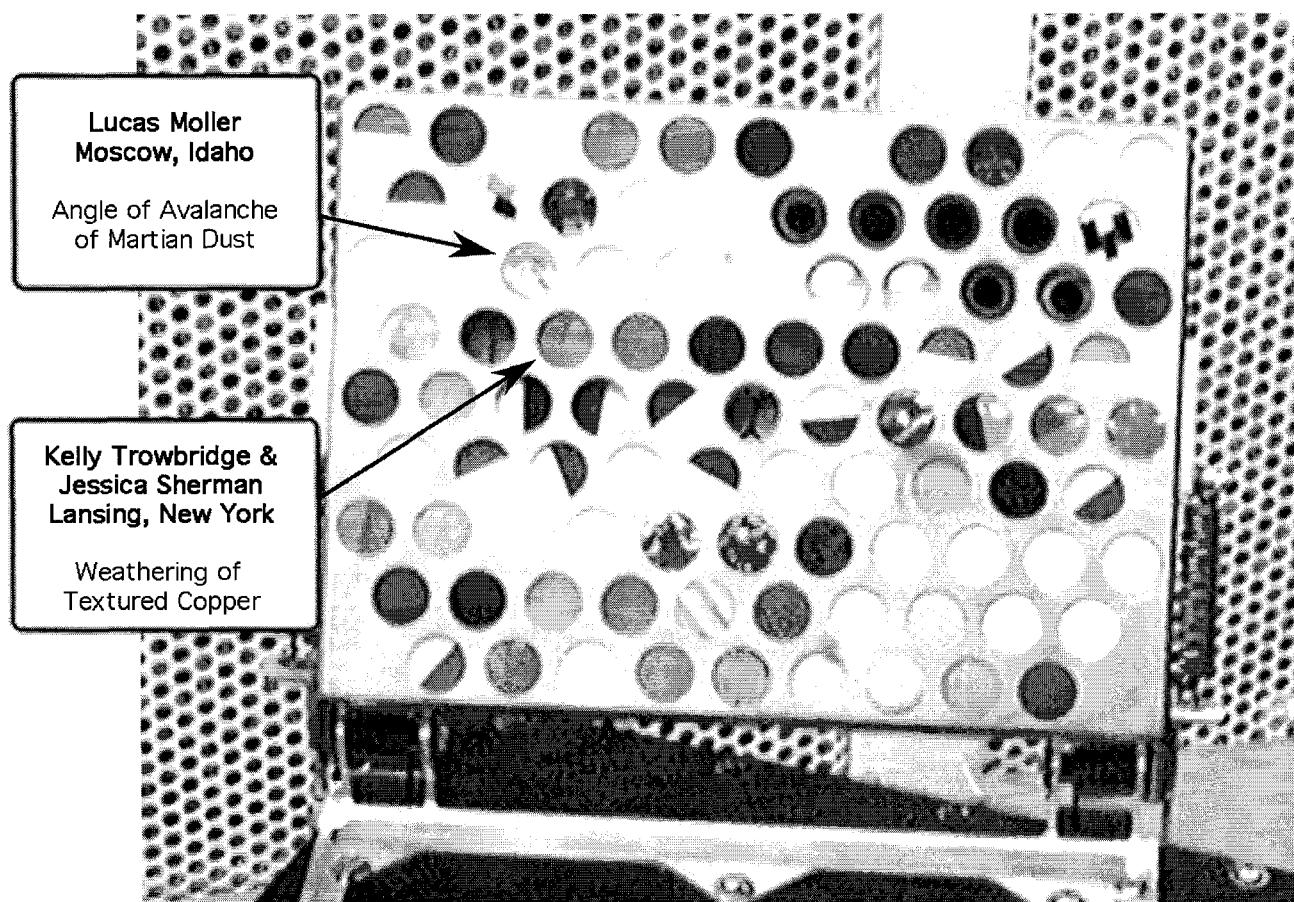
JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA,
TUCSON ARIZONA

The MECA Patch Plate



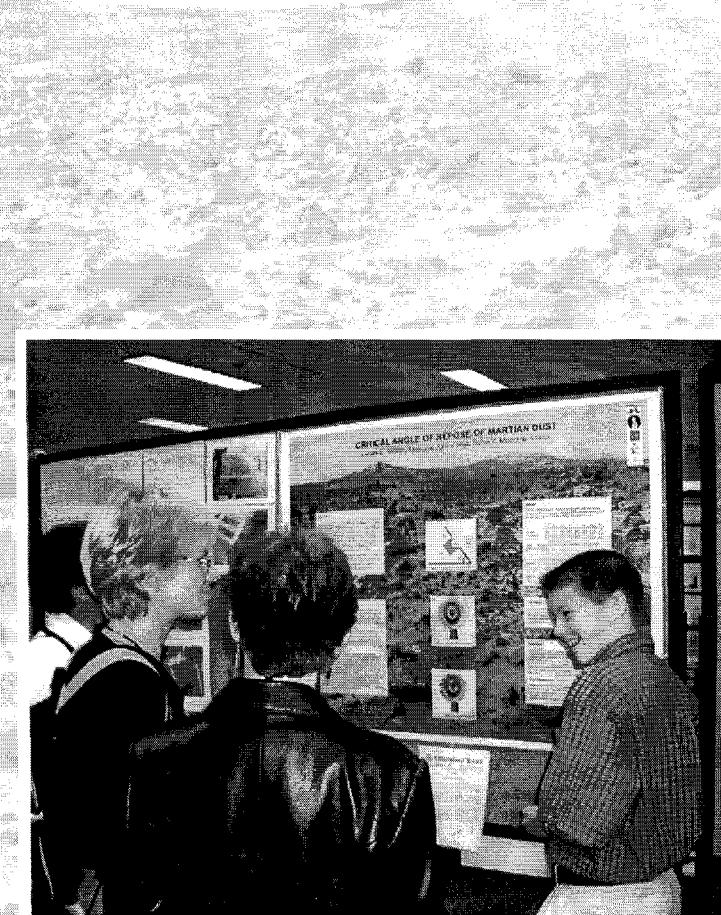
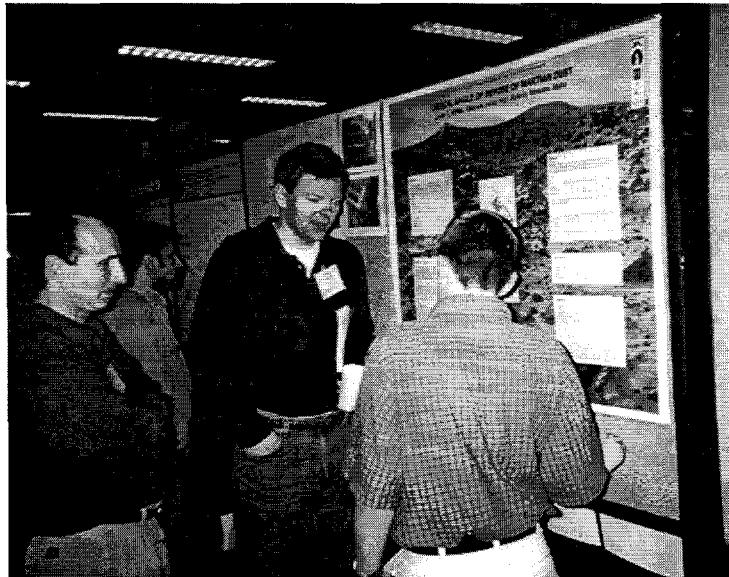
JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA

Lucas Möller at 2001 LPSC



Special thanks to the Idaho Space Grant Consortium for sponsoring Lucas' trip to the 2001 Lunar and Planetary Science Conference.



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA,
TUCSON ARIZONA

Jessica Sherman and Kelly Trowbridge working with Bill Nye



Special thanks to the Cornell Nanobiotechnology Center for sponsoring Jessica's and Kelly's laboratory calibration of their Contradistinctive Copper nanoexperiment.



JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA

Planned Outreach Activities

Student Nanoexperimenters

- Will provide science support of SNOOPY by calibrating their experiments.
- Will publish their results in the scientific literature and present them at the Lunar and Planetary Science Conference.

Students Worldwide

- Curricular Materials for students to duplicate SNOOPY Nanoexperiments using common materials and equipment.
- Should SNOOPY fly, the data will be made available for students and teachers worldwide as soon as it is available to the project.



JPL



THE PLANETARY SOCIETY

THE UNIVERSITY OF
ARIZONA.
TUCSON ARIZONA